

REMARKS

Claims 1-29 and 66-74 are pending, with claims 1 and 74 being in independent form. Claims 1-4, 8, 17, 19, 20, 24, 25, 66, 70, and 71 are amended. Claim 74 is added. Claims 5, 7, and 30-65 are canceled without prejudice or disclaimer. Applicants reserve the right to file Divisional and/or Continuation Applications with claims directed to the canceled subject matter at a later date.

In the Office Action, claims 3 and 20 are objected to for minor informalities. Applicants have amended the claims to address the Examiner's concerns. Applicants have also amended claims 19, 70, and 71 to correct minor typographical errors. The scopes of the amended claims are not narrowed or even changed by this Amendment. Accordingly, persons interpreting the claims should not limit them only to their literal scopes.

Claim 3 is rejected for lack of enablement. Applicant has amended claims 2 and 3 to address the Examiner's concern. Support for the amendment may be found on page 8, ll. 15-17 of the specification, which describes that "It is also contemplated by the present invention that raw materials be in the form of nanotube structures with a composition of $B_xC_yN_z$ (B= boron, C= carbon, and N=nitrogen). Persons skilled in the art will understand that nanotubes can comprise carbon, and that such carbon nanotubes can also comprise at least one of boron and nitrogen (e.g., x and z in the above formula greater than or equal to 1). Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw this rejection.

Claims 42-47 and 66-73 are rejected for lack of enablement. The rejection of claims 42-47 is rendered moot by the cancellation of these claims. With respect to claims 66-73, the Examiner contends that the specification does not reasonable provide enablement for depositing a pattern of nanostructure-containing material onto the substrate while depositing the nanostructure-containing material onto the same immersed electrode substrate with a direct or alternating current. Applicants respectfully disagree for the following reasons.

Applicants describe on pages 19 and 20 of the specification, in conjunction with the exemplary embodiments shown in FIGS. 8A-8D, the depositing of a pattern of nanostructure-containing material onto a substrate. Persons skilled in the art would understand from this description that the substrate could be provided with a

first surface having a mask disposed thereon, the mask having openings through which areas of the first surface are exposed. The skilled artisan would also understand that in applying the direct or alternating current to the electrode and the masked substrate, an electrical field therebetween can be created causing the nanostructure-containing material to migrate toward, and attach to, those exposed areas on the first surface of the substrate. Moreover, persons skilled in the art would understand that in removing the mask, a pattern of nanostructure-containing material would be deposited onto the substrate.

Notwithstanding the above, Applicants have amended claim 66 to more particularly point out and describe their invention. Again, the claim scope has not been narrowed or even changed by the Amendment, thus those interpreting this claim should not limit it only to its literal scope.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 66-73 for lack of enablement for at least the above reasons. Moreover, since no art rejections are raised in the Action against these claims, the claims are believed to be allowable and a Notice to this effect is respectfully requested at an early date.

Claims 1, 7, 8, 17, and 24 are rejected for indefiniteness. Applicants have amended and/or canceled these claims to address the Examiner's concerns where considered appropriate. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the indefiniteness rejection as well.

Turning to the art rejections, claim 1 is rejected for anticipation by the document titled "Electrophoretic Deposition of Nanosized Diamond Particles" to Affoune et al. ("Affoune") and/or by U.S. Patent No. 6,258,237 to Gal-Or et al. (Gal-Or). The amendment of claim 1 overcomes these anticipation rejections for the following reasons.

Anticipation requires that every feature of the claimed invention be shown in a single prior document. In re Paulsen, 30 F.3d 1475 (Fed. Cir. 1994); In re Robertson, 169 F.3d 743 (Fed. Cir. 1999). Claim 1 positively recites features that are not described in either of the cited document.

For example, claim 1 as amended, recites, among other things, "forming a suspension of pre-formed nanostructure-containing material in a liquid medium, the

nanostucture-containing material comprising at least one of nanotubes and nanowires". Neither Affoune nor Gal-Or describe, explicitly or inherently, forming a suspension of pre-formed nanostucture-containing material comprising at least one of nanotubes and nanowires. Instead, both documents describe the electrophoretic deposition of only diamond particles.

A "particle" is defined as "a relatively small or the smallest discrete portion or amount of something". Merriam-Webster Dictionary (10th Edition). In contrast, a "tube" is defined as "any of the various usually cylindrical structures or devices, such as a hollow elongated cylinder". Id. Similarly, a wire is defined as "material in the form of a usually very flexible thread or slender rod". Id. Nanotubes and nanowires are tubes and rods of material that are nanometer-sized in at least one direction. For example, a single-walled carbon nanotube can have a diameter of 1-2 nm, while having a length of nearly a micron. Thus, Affoune's and Gal-Or's respective descriptions of diamond particles do not anticipate the claimed suspension of pre-formed nanostucture-containing material comprising at least one of nanotubes and nanowires. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the anticipation rejections of claim 1.

Claims 9 and 17 are rejected for obviousness over Affoune. Claim 9 recites, among other things, "wherein the pre-formed nanostucture-containing material comprises single-walled carbon nanotubes". Claim 17 recites "the nanostucture-containing material comprises single-walled carbon nanotubes". The Examiner asserts that the selection of any known equivalent nanoparticle material would be within the level of ordinary skill in the art. Applicants respectfully disagree for the following reasons.

First, for the reasons discussed above, nanotubes and nanowires are not "equivalent" to nanoparticles as the Examiner asserts. Moreover, Affoune and Gal-Or teach away from the use of nanotubes and nanowires. For example, Affoune acknowledges the existence of nanotubes, noting that "their novel properties mainly originate from their specific sizes and symmetry", but then goes on to state that they "were interested in the isolation by the electrophoretic deposition technique (EPD) of nanodiamond particles in order to convert them later to nanographite by heat treatment". See Introduction, p. 547 (emphasis added). Affoune's cursory

acknowledgment of the unique geometry of nanotubes, followed by a detailed description of the techniques and mechanisms for depositing nanoparticles with separation and having a spherical shape (see abstract) using EPD would discourage persons skilled in the art from depositing nanotubes using the described methods as the Examiner asserts.

Gal-Or describes a method for electrophoretic diamond coating and compositions for effecting same. In col. 1, ll. 20-21, Gal-Or describes that "As used herein, a diamond coating is a coating of carbon primarily in the SP^3 phase". Persons skilled in the art would understand that nanotubes, particular carbon nanotubes, do not exist in the SP^3 phase, and would be discouraged from forming a "diamond coating" including nanotubes using the techniques described by Gal-Or. Accordingly, claims 9 and 17 are believed to be novel and inventive over Affoune (and Gal-Or) for these reasons as well.

Claim 1 is rejected for obviousness over U.S. Patent No. 5,906,721 to Bojkov et al. ("Bojkov"). The amendment of claim 1 overcomes the obviousness rejection for the following reasons.

In accordance with the MPEP, three criteria must be met to establish a prima facie case of obviousness. First, the cited documents must describe or suggest all of the claim features. Second, there must be some suggestion or motivation, either in the cited documents themselves or in the knowledge generally available to one of ordinary skill in the art, to have combined the teachings of the cited documents. Third, there must have been a reasonable expectation that the documents could have been successfully combined to yield the claimed invention.

The rejection raised in the Action cannot stand at least because the cited document does not describe or suggests all of the claim features. Motivations to modify the teachings of the cited document to reach the claimed invention and a reasonable expectation of success would also be absent, but it should be sufficient to point out the absent features.

For example, claim 1 as amended, recites, among other things, "forming a suspension of pre-formed nanostructure-containing material in a liquid medium, the nanostructure-containing material comprising at least one of nanotubes and nanowires". Bojkov describes a composition and method for preparing phosphor

films exhibiting decreased coulombic aging. As stated by the Examiner, Bojkov describes phosphors in powder form that include only particles ranging from 1 to 20 microns, or smaller. Nowhere does Bojkov describe depositing preformed nanostructure-containing material comprising at least one of nanotubes and nanowires.

Moreover, in the absence of any suggestion in Bojkov as how to deposit such nanostructure-containing material, one would have faced a serious engineering problem in forming a substrate having a nanostructure-containing material comprising at least one of nanotubes and nanowires, as required by claim 1. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw obviousness rejection of claim 1 based on Bojkov as well.

With respect to claim 27, the claim recites, among other things, adding additional materials into the suspension of pre-formed nanostructure-containing material comprising small particles of at least one of: iron; titanium; lead; tin; or cobalt; and wherein the particles have a diameter less than 1 micrometer. The Examiner asserts that the claim is obvious over either Affoune, Gal-Or, or Bojkov in view of U.S. Patent No. 5,296,117 to De Jaeger et al. ("De Jaeger"). In particular, the Examiner asserts that De Jaeger described these features in the paragraphs crossing columns 10 and 11 of the cited document. Applicants respectfully disagree.

Applicants have reviewed the cited portion, and cannot find any cited passage that either describes or suggests adding additional materials into the suspension of pre-formed nanostructure-containing material comprising small particles, much less adding small particles of at least one of: iron; titanium; lead; tin; or cobalt, wherein the particles have a diameter less than 1 micrometer. Accordingly, Applicants respectfully request that the Examiner either reconsider and withdraw this rejection, or particularly point out where the cited document describes or suggest this feature.


Finally, new claim 74 is fully supported by the original disclosure and is believed to be novel and inventive for at least the reasons stated above. In particular, support for the claim may be found in original claims 1 and 27, and on pages 15 and 16 of the written description.

For the foregoing reasons, Applicants believe the application is in condition for allowance, and respectfully request that a Notice to this effect be provided at an early date. If any questions remain, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By:

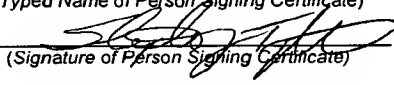

Stephen J. Tytran
Registration No. 45,846

P.O. Box 1404
Alexandria, Virginia 22313-1404
(919) 941.9240

Date: March 1, 2004

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addresses to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on March 1, 2004

Stephen J. Tytran
(Typed Name of Person Signing Certificate)


(Signature of Person Signing Certificate)

Date of Signing: March 1, 2004